Dryden Flight Research Center
Edwards, California 93523-0273

DCP-S-033
Revision: Baseline

## DRYDEN CENTERWIDE PROCEDURE

## CODE S

# LIFTING DEVICES

Electronically Approved by:
Associate Director

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# DOCUMENT HISTORY PAGE

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# 1.0 INTRODUCTION

## 1.1 Purpose

This Dryden Centerwide Procedure (DCP) establishes the minimum requirements needed to safely operate lifting devices owned or controlled by DFRC.

## 1.2 Applicability

Compliance with this DCP is mandatory for persons responsible for NASA owned and NASA contractor supplied lifting devices and equipment used in support of DFRC operations.

## 1.3 Scope

This DCP supplements NSS/GO-1740.9B; 29 CFR 1910.178 to 184; 29 CFR 1926.550; California CCR, Title 8; ANSI, ASME and other standards where they are "incorporated by reference" by either OSHA or NASA. Lifting devices covered are overhead and mobile cranes, derricks, hoist and winches, associated equipment such as, hooks, hydra-sets, and slings. This DCP does not contain procedures for Critical Lift. Critical Lift procedures are contained in DCP-S-028. Critical Lifts.

# 2.0 APPLICABLE DOCUMENTS

## 2.1 Authority Documents

NBH 1700.1 (V1-1B); NASA Basic Safety Manual. NASA's policy and guidelines for safety assurance.

NSS/GO-1740.9B, NASA Safety Standard for Lifting Devices and Equipment. (to be replaced by NASA-STD 8719.9).

29 CFR 1910.178 to 184; This series of OSHA directives include: Powered Industrial Trucks (178); Overhead and Gantry Cranes (.179); Crawler Locomotive and Truck Cranes (.180), Derricks (.181); Helicopters Cranes (.183); and Slings (.184).


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29 CFR 1910.306, (b); Special Purpose Equipment and Installations. This paragraph applies to the installation of electric equipment and wiring used in connection with cranes, monorail hoists, hoists, and runways.

29 CFR 1926. Subpart N, Cranes and Derricks, Hoists, Elevators, and Conveyors; Defines the safe operation of lifting devices in construction operations.

ANSI/ASME B56.1, Low Lift and High Lift Trucks; Portions are incorporated by reference as specified in 29 CFR 1910.6.

ANSI/ASME B30.5, Mobile and Locomotive Cranes; Portions are incorporated by reference as specified in 29 CFR 1910.6.

2.2 Guideline Documents

ANSI/ASME B30.2; Overhead and Gantry Cranes.
ANSI/ASME B30.4; Portal, Tower, and Pillar Cranes.
ANSI/ASME B30.5; Mobile and Locomotive Cranes.
ANSI/ASME B30.7; Base Mounted Drum Hoist.
ANSI/ASME B30.9; Slings.
ANSI/ASME B30.10; Hooks.
ANSI/ASME B30.11; Monorails and Underhung Cranes.
ANSI/ASME B30.16; Overhead Hoist (underhung).
ANSI/ASME B30.17; Overhead and Gantry Cranes, (single glider).
NFPA 30, Flammable and Combustible Liquids Code.
NFPA 58, Liquefied Petroleum Gases
Crane Manufacturer's Association of America (CMAA), publications #70 and #74.

## 3.0 DEFINITIONS

Definitions for lifting devices may be found on the Internet by accessing the Occupational Safety and Health Administration (OSHA) Home Page (http://www.osha.gov), select "Standards" and then the appropriate CFR and section.

### 3.1 OSHA Definitions for Lifting Devices

1. Crawler Locomotive and Truck Cranes. See 29 CFR 1910.180 (a) for definitions applicable to these cranes.

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2. Derricks. See 29 CFR 1910.181, (a) for definitions applicable to derricks.

3. Overhead and Gantry Cranes. See 29 CFR 1910.179, (a) for definitions applicable to these cranes.

4. Slings. See 29 CFR 1910.184 (b) for definitions applicable to slings.

3.2 Critical Lifts: Critical lifts include the lifting of personnel, high value articles, spacecraft hardware, one-of-a-kind, or major components whose loss or damage would:

- Cause significant work delay.
- Cause undetectable damage resulting in future operational or safety problems.
- Result in the release of a hazardous material or other undesirable condition.
- Present a potentially unacceptable risk of personnel injury or property damage.
- Lifting of any type explosive material.

Critical lift procedures may be required when a non-conventional rigging procedure is required or when the load being lifted is 75 percent or greater of the maximum lifting capacity of the lifting device. See DCP-S-028, Critical Lifts, for DFRC requirements.

3.3 Lifting Devices: For the purpose of this document, the definition for Lifting Devices is divided into two categories. These are; 1) Cranes (overhead and mobile), Powered Industrial Trucks, Derricks, and Hoists; 2) Other associated equipment such as, Hydra-sets, Turnbuckles, Slings, Hooks, and similar equipment which receive the stress of the load. Excluded equipment is building elevators, aerial buckets, boom supported work platforms, scissor lifts, and manlifts.

3.4 Routine Lifts (non-critical lifts): Routine lifts are those that occur on a day-to-day basis in the normal operation of the Center.

## 4.0 ROLES and RESPONSIBILITIES

### 4.1 Overview


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The chain of responsibility for ensuring that there is a safe work environment at DFRC that follows required safety standards, regulation, codes, and guidelines starts with the Center Director and flows downward through management and supervisors. In addition, each person who works at DFRC must understand that a "condition of employment" is to observe all safety specifications applicable to the task being performed.

4.2 Center Director

The Center Director has the ultimate responsibility of ensuring that a comprehensive safety program for the protection of people, resources, and equipment during lifting operations is in place and in compliance with regulations, standards, and appropriate guidelines.

4.3 Directorates and Single Letter Offices

Directorates and single letter offices shall be responsible for:

- Providing funding for training, operator certifications, inspections, upgrades, and repairs to lifting devices under their control.
- Ensuring that regulations, codes, and appropriate guidelines pertaining to lifting devices and their operation are strictly followed.
- Following deviation procedures for proposed lifting operations that do not comply with regulatory requirements. See NSS/GO-1740.9B, NASA Safety Standard for Lifting Devices and Equipment, par. 104, for waiver instructions.

4.4 Chief of Aircraft Maintenance Division

The Chief of Aircraft Maintenance Division shall designate a person from his/her organization to be the Lifting Devices Manager. The Lifting Devices Manager will have the following responsibilities:

- Implementing the requirements of this DCP, codes, and guidelines that pertain to the lifting devices under DFRC control.
- Developing an inventory data base of lifting devices under DFRC control.
- Providing forecasting for funding for testing, inspection, certification and re-certification of lifting devices under DFRC control.
- Assisting in developing a training program for lifting device operators.

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- Reviewing variance requests using supporting directives and guidelines.

4.5 Office of Safety and Mission Assurance (Code S)

The Safety, Health, and Environmental Office (Code SH) has safety oversight for the DFRC lifting device safety and shall:

- Be responsible for implementation and enforcement of lifting device safety procedures.
- Provide lifting device operators with regulatory changes and reviewing these changes for impact at DFRC.
- Investigate lifting device incidents and accidents and report findings to DFRC management and regulatory agencies.

4.6 Vehicle and Aerospace Ground Equipment Contractor

The Vehicle and Aerospace Ground Equipment contractor shall:

- Provide maintenance for mobile lifting devices owned by DFRC.
- Perform required periodic recertification and testing of mobile lifting devices.
- Maintain test reports, inspections results, maintenance performed, and certifications on file and available for inspection.
- Add new lifting devices to preventive maintenance and periodic inspection program.
- Tagout or lockout equipment that is in need of service. See DCP-S-025, Lockout/Tagout, for requirements and procedures.

See 29 CFR 1910.179 (k) and NSS/GO 1741.9B for maintenance and repair requirements.

4.7 Facilities Maintenance Contractor

The Facilities Maintenance Contractor shall:

- Provide inspection, maintenance and repair service for fixed (non-mobile) lifting devices owned by DFRC.
- Perform required periodic recertification and testing of fixed lifting devices.


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- Maintain test reports, certifications, records of service, maintenance, and inspections on file and available for inspection.
- Add new equipment to preventive maintenance and periodic inspection program.
- Tagout or lockout equipment that is in need of service. See DCP-S-025, Lockout/Tagout, for requirements and procedures.

See 29 CFR 1910.179 (k) and NSS/GO 1741.9B for maintenance and repair requirements.

4.8 Supervisors

Supervisors of lifting device operations are responsible for following NASA, OSHA, and appropriate guidelines including:

- Ensuring lifting devices under their control have current inspections and are in proper operating condition or are tagged out or locked out of service.
- Ensuring only trained and qualified persons operate lifting devices
- Being knowledgeable of and ensure lifting device activities are conducted in accordance with OSHA and NASA standards, and this document.
- Notifying the Safety Office of any unusual lifts where extra safety precautions may be required. For Critical Lifts see DCP-S-028.
- Notifying the Safety Office of any incidents or close calls resulting from lifting operations

4.9 Lifting Device Operators

Lifting device operators are responsible for following NASA, OSHA and appropriate guidelines including:

- Maintaining a valid operator's certificate for the type of equipment they are operating.
- Insuring that lifting device inspections are current and required functional tests are completed before lifts are attempted.
- Ensuring that the appropriate rigging equipment is used for the lift.
- Knowing the load weight and contacting the Safety Office prior to a lift when the load weight is greater than 75 percent of the rated load limit of any portion of the equipment. (May require critical lift procedures).

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- Ensuring that the designated signal ground support person uses standard hand signals. (Explanations and diagrams of hand signals for cranes and hoists are listed in NSS/GO-1740.9B, APPENDIX C, Hand Signals).
- Ensuring that persons remain clear of loads except when a waiver allows workers to be under a load.
- Avoiding shock starts and stops. Rapid starts and stops may overload the equipment.
- Remaining at the controls when the load is suspended.

4.10 Riggers and Support Personnel

Riggers and support personnel shall:

- Understand that the lift equipment operator is the responsible person for the lift except when a designated Lift Supervisor is on site as is the case when a critical lift is being performed.
- Know and use standard hand signals.

## 5.0 GENERAL SAFETY REQUIREMENTS

The safe operation of any lifting device is determined by the rated load limit of its weakest member. In no case, except during a scheduled load test, shall any component be stressed above its rated load limit

5.1 Power Line Danger Zones.

Except where the electrical distribution and transmission lines have been de-energized and visibly grounded at the point of work, or where insulating barriers, not a part of or an attachment to the lifting device, have been erected to prevent physical contact with power lines the following safe distances will be observed.

TABLE 1

Power Line Danger Zones

| Voltage in kV | Minimum Required Distance |
|---|---|
| 0 to 50 | 10 feet |
| 50 to 200 | 15 feet |
| 200 to 350 | 20 feet |
| 350 to 500 | 25 feet |
| 500 to 750 | 35 feet |


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|---|---|
| 750 to 1000 | 45 feet |

Any overhead electrical line shall be considered an energized line unless and until the person responsible for the line or the electrical utility authorities indicate that it is not energized and that it is properly grounded.

Before starting operation near electrical lines, the organization responsible for the line shall be notified and provided with all the pertinent information. The responsible organization's cooperation shall be requested.

5.2 Overhead Crane Testing and Inspection

The operation of overhead cranes and hoists at DFRC shall comply with 29 CFR 1910.179, NSS/GO-1740.9B, Chapter 2, this DCP, and appropriate guideline documents.

5.2.1 Test Requirements

- Proof Test: Proof tests will be conducted before first use, after new installation, extensive repair or modification, there is a question of design, or questionable results of a previous test. The proof test will use a dummy load as close as possible but not greater than 1.25 percent of rated capacity of the crane.
- Rated Test: Rated tests shall be done on each crane every four (4) years unless it is used for critical lifts which requires a rated test every year. A rated test requires a dummy load lift of 100 +5/-0 percent of the crane's operational rated load.
- Operational Test: This test is accomplished to check that all working parts of the crane are functional within design limits. Items to be tested include load hoisting at various approved speeds, braking and holding mechanisms, trolley and bridge travel (in all directions), function of all limit switches, emergency stops switches, and any other safety features excluding thermal safety devices.

  See NSS/GO-1740.9B Par. 202, Testing.

5.2.2 Inspections Requirements

Periodic inspection shall be performed at varying intervals as established by OSHA, NASA, and manufacturer's requirements. Required inspections include:

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- Daily: Inspections shall be performed on cranes and hoists prior to their first use of the day. Inspections will be made using the guidelines listed in 29 CFR 1910.179, (j), NSS/GO 1741.9B, Par. 203d, and applicable manufacturer's instructions.
- Monthly: Inspection shall be performed to inspect for wear and proper operation and also for the distortion, twist, or stretch of ropes and chains. See29 CFR 1910.179 (m) and NSS/GO 1741.9B Par. 203c, for inspection and repair requirements.
- Annual: Inspection shall be performed to inspect the general condition of the lifting equipment. See 29 CFR 1910.179 (j) and NSS/GO 1741.9B Par. 203e, for inspection and repair requirements.
- Idle and Standby Cranes and Hoists: Cranes and hoists idle for more than 1 month shall be inspected prior to use in accordance with NSS/GO 1741.9B par. 203d and 203e.

5.3 Mobile Cranes

5.3.1 General Safety Requirements

- A substantial and durable rating chart (load rating chart) with clearly legible letters and figures shall be provided with each crane and securely fixed to the crane cab in a location easily visible to the operator while seated at his/her control station.
- Cranes shall be stable and level within 1 percent of grade before lifting a load.
- The crane's working radius shall not be greater than the maximum rated load based on the length of the boom against the weight of the load being lifted.
- Outriggers, on equipment having them, shall be used during each crane "set" at DFRC. Outriggers may be used to level the crane. Shoring will be with materials that will not crush under load. The weight of accessory equipment such a the block, hooks, slings, etc will be considered as part of the load.
- Cranes will not be used for side pulls unless authorized by a responsible person who has determined the stress and stability factors of the crane.

5.3.2 Test Requirements

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- Proof Test: Proof tests will be done on mobile cranes before first use after new installation, extensive repair or modification, or alteration is accomplished to those components directly involved with the lifting or holding capability of a crane. The proof test will be accomplished at the minimum working radius and be as close as possible to, but not to exceed, 110 percent of the rated load at the given radius A one time proof load test using the maximum working radius will be accomplished on new cranes. The maximum load for the new crane test will be as close as possible to, but not to exceed, 110 percent of the crane's working radius rated load. Proof load tests conducted by the manufacturer on new cranes are acceptable when certification is provided to verify the extent and thoroughness of the test.

- Rated Test: Rated tests shall be done on each crane every four (4) years unless it is used for critical lifts which requires a rated test every year. A rated test requires a dummy load lift of 100 +5/-0 percent of the crane's operational rated load.
- Operational Test: Operational tests are accomplished to check that all working parts of the crane are functional within design limits. Items to be tested include load hoisting at various approved speeds, braking and holding mechanisms, function of all limit switches, emergency stops switches, and any other safety features excluding thermal safety devices.

  See NSS/GO-1740.9B Par. 302, Testing

5.3.3 Inspections Requirements:

Periodic inspection shall be performed at varying intervals as established by OSHA, NASA, and manufacturer's requirements. Required inspections include:

- Daily: Inspections shall be performed on cranes and their associated equipment before their use each operational day. Inspections will be made using the guidelines listed in 29 CFR 1910.180 (d) (3), and NSS/GO 1741.9B Par. 303d, and manufacturer's instructions.
- Monthly: Monthly inspections shall be performed to inspect for equipment wear, and distortion, twist, or stretch of ropes and chains. See29 CFR 1910.180 (d) (4) and NSS/GO 1741.9B Par. 303e for inspection requirements.

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- Annual: Annual inspection shall be performed to determine the general condition of the lifting equipment. See 29 CFR 1910.180 (d)(4) and NSS/GO 1741.9B Par. 303e, for inspection requirements.
- Idle and Standby Cranes: Cranes idle for more than 1 month shall be inspected prior to use in accordance with 29 CFR 1910.180 (d) (5) and NSS/GO 1741.9B par. 303e.

5.4 Derricks

The training, certification, testing and, inspection of derricks is similar to that required for mobile cranes. For detailed requirements see 29 CFR 1910.181 Derricks, and 29 CFR 1926.550, Cranes and Derricks.

5.5 Helicopter Cranes

Helicopter cranes are primarily used in construction. When use at DFRC, helicopter cranes shall comply with Federal Aviation Administration regulations, 29 CFR 1910.183, and 29 CFR 1926.551, Helicopters.

5.6 Powered Industrial Trucks

5.6.1 Included Equipment

This group of equipment includes forklifts, tractors, platform lift trucks, motorized hand trucks and other specialized industrial trucks powered by electric motors or internal combustion engines. Not included are nonflammable compressed gas-operated engines, earth moving equipment, and over-the-road vehicles. Because of the potential for causing accidents and injury when not operated correctly, OSHA has established strict rules for operator training and procedures on the use of this equipment.

5.6.2 Equipment Designation

OSHA lists eleven (11) designations for powered industrial trucks. These designations provide controls on the use of the equipment in various environments, locations, and working conditions. These designations are found in 29 CFR 1910.178 (b) and (c) and shall be strictly followed at DFRC.

5.6.3 Design and Construction Requirements

Powered industrial trucks operated by DFRC shall meet the design and construction requirements established in ANSI/AMSE 56.1, Part II, American National Standard for Powered Industrial Trucks.

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5.6.4 Carbon Monoxide, Fuel Handling, and Batteries

- Concentration levels of carbon monoxide gas created by powered industrial trucks shall not exceed the levels specified in 29 CFR 1910.1000, Air contaminants.
- Fuel handling and storage shall be in accordance with 29 CFR 1910.110, Storage and handling of liquefied petroleum gases, .178 (f), Fuel handling and storage, NFPA 30, Combustible and Flammable Liquids Code, and NFPA 58, Liquefied Petroleum Gases.
- The changing and charging of batteries will be in accordance with 29 CFR 1910.178(g), Changing and charging of storage batteries.

5.6.5 Design and Construction Requirements.

Powered industrial trucks operated by DFRC shall meet the design and construction requirements established in ANSI/ASME 56.1, Part II, American National Standard for Powered Industrial Trucks.

5.6.6 Inspections, Testing, and Maintenance

- Only trained and authorized personnel shall test, inspect, and maintain powered industrial trucks.
- At the start of each work shift during which the powered industrial truck will be used, the operator shall conduct a pre-operational inspection. If an operator cannot verify that an inspection was conducted he/she must do an inspection before the unit is operated. Should a malfunction be found the unit will be taken out of service using lockout/tagout procedures pending repair.
- Powered industrial trucks shall undergo periodic inspections and testing in accordance with the manufacturer's recommendations, NSS/GO-1740.9B, (where appropriate), 29 CFR 1910.178, and from experience gained by operating the equipment.

5.6.7 Fork Trucks (Forklifts)

Forklifts pose a particular hazard when not operated properly or maintained in good repair. Special attention shall be given to forklift controls, brakes, steering, lift overload devices, and tilt mechanisms.

5.6.7.1 Forklift Inspection and Testing:


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In addition to the pre-inspections required on all powered industrial trucks, as required by Par. 5.6.6 above, forklifts shall receive additional inspections and testing as follows:

- Qualified inspectors shall inspect new, altered, modified, or extensively repaired forklifts prior to initial use.
- The Vehicle and Aerospace Ground Equipment Contractor shall inspect and load-test DFRC forklifts annually to 100 percent of their rated capacity.
- All load-bearing parts of forklifts used for critical lifts shall have a nondestructive test ever 5 years. See DCP-S-028, Critical Lifts for details.
- Following a suspected or known overload incident, the forklift shall be given an inspection and load test to 100 percent of its rated capacity. This test will be performed on the forks, carriage, mast, and other stress points.
- If any malfunctions or defects are found during testing, the forklift will be tagged out of service pending repairs.

## 6.0 ASSOCIATED EQUIPMENT

Associated equipment includes any equipment not mention above that accepts the weight of the load. This equipment shall be inspected during daily and periodic inspections of the equipment of which they are a part.

In every case, a lift will not exceed the rated load limit of the weakest component of the lifting device. Each component will be inspected, tested, and maintained in accordance with manufacturer's recommendation, OSHA, and NASA directives.

### 6.1 Hydra-sets

Hydra-set is the trade name for a hydraulically operated instrument installed between the hook and load that provides an indication of the applied load as well as allowing the operator better control of the load. The hydra-set shall be inspected and maintained as part of the crane or hoist lifting assembly. For specific requirement of inspection, testing, and maintenance of hydra-sets, see NSS/GO-1740.9B Chapter 6: HYDRA-SETS.

### 6.2 Slings

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For this document a sling is the lifting assembly and associated hardware that comes in contact with the load. Slings may be constructed of wire rope, alloy steel chain, metal mesh, natural or synthetic fibers, and structural slings. Associated sling equipment includes shackles, turnbuckles, eyebolts, etc. Inspection, testing and maintenance of slings and associated equipment shall be similar to that required of cranes and hoists lifting assemblies. For details on inspection, testing, and maintenance of slings and associated equipment see 29 CFR 1910.184 and NSS/GO-1740.9B Chapter 8: SLINGS.

### 6.3 Hooks

Hooks, a critical part of the lifting equipment, shall be examined for wear, deformation, cracks, latch damage, and improper attachment with particular emphasis on the following defects:

- Wear exceeding 10 percent, or as recommended by the manufacture, of original sectional dimension.
- A bend or twist exceeding 10 degrees from the plane of the unbent hook.
- An increase in throat opening exceeding 15 percent or as recommended by the manufacture.
- Latches that are inoperative or fail to fully close the throat opening because of wear or deformation.
- Cracks, nicks, and gouges.

For specific requirements of inspection, testing, and maintenance of hooks see NSSO/GO-1740.9B Chapter 5: HOOKS.

## 7.0 RECORDS

### 7.1 Records of Tests

Following each load test of a lifting device, a written report will be made indicating the procedures used and the results of the test. If inadequacies are found they will be documented and if necessary corrected before the lifting device may be put into operation. These reports will be maintained by the owner/user of the equipment in an active file for two (2) test cycles then maintained in accordance with NPD 1441.1, Records Retention, Schedule 1, 117 [1700] (N 21 -6). A new tag stating the test date and the next

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required load test or certification expiration date will be affixed at an easily readable location on the lifting device.

7.2 Records of Inspections

Following each formal periodic inspection a qualified and authorized person shall prepare a written, dated, and signed inspection report. The report shall include procedures reference and adequacy of the lifting equipment. Inadequacies shall be documented and, if necessary for safety or operational requirements, repairs accomplished before the equipment is placed into service. An active file will be maintained for two (2) inspection cycles and then maintained in accordance with NPD 1441.1, Record Retention, Schedule1, 117 [1700] (N 21- 6).

## 8.0 TRAINING AND CERTIFICATION

Only trained and certified operators shall be permitted to operate lifting devices at DFRC.

8.1 Overhead and Gantry Cranes, Mobile (truck cranes), and Hoists

Training for the equipment listed above shall be required annually and consist of the following:

(a) Classroom training in safety and first aid/emergency procedures, general performance standards, requirements, pre-operational checks, and safety related defects and symptoms.

(b) Hands-on training and operational demonstration.

(c) Written examination.

8.2 Powered Industrial Trucks

Training for powered industrial trucks (primarily forklifts at DFRC) is the responsibility of the Vehicle and Aerospace Ground Equipment Contractor.

8.2.1 Forklifts

Trainees may operate forklifts at DFRC only:

- Under the direct supervision of person/s who have the knowledge, training, and experience to train operators and evaluate their competence, and;
- Where such operation does not endanger the trainee or other employees.

8.2.2 Annual Training Requirements. Annual training may include a combination of the following:

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- Formal instructions e.g., lecture, discussion, interactive computer learning, video tape, and written material.
- Practical training e.g., demonstrations performed by the trainer and practical exercises performed by the trainee

8.2.3 Training Program Content

Forklift operators shall receive annual training in the following topics unless the employer can demonstrate certain topics are not applicable to safe operation of the forklift in the employer's workplace. Training topics are:

- Review of operator's manual for proper operation, warnings and precautions for the truck the operator will be authorized to operate.
- Differences between the truck controls and instrumentation, where located, what they do, and how they work and those of other vehicles such as automobiles
- Engine or motor operations.
- Steering and maneuvering.
- Visibility including restrictions when loaded.
- Fork attachment adaptation, operation, and use limitations.
- Vehicle stability, capacity and operating limitations.
- Inspections required by the operator.
- Refueling and/or battery recharging.
- Hazards of using lifting devices near electrical power lines.

Workplace-related topics to be covered:

- Surface conditions where vehicle will be operating.
- Composition of loads to be carried.
- Load stability, manipulation, stacking, and unstacking.
- Pedestrian traffic in area where the vehicle will be operated.
- Space restricted and hazardous areas where vehicle will be operated.
- Ramps, truck loading, and other surfaces that could affect the vehicle.

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- Ventilation and other environmental consideration e.g., consequences of build-up of carbon monoxide, diesel fumes, etc.

8.3 Refresher Training

Refresher training will be conducted when:

- The operator has been observed to operate the equipment in an unsafe manner or has been involved in an accident or incident.
- The operator has received an evaluation that reveals he/she is not operating the equipment safely.
- The operator is assigned to operate a different type crane or truck.
- Conditions in the workplace or type of tasks change to the point added training is needed.

8.4 Certification Extension

In the event training is not offered or other situations such as the operator being TDY, etc., the supervisor may extend the person's certification until the first available class. Extensions may not exceed six months for any reason.

8.5 Training Records

Employee's training records will be maintained by his/her supervisor or in a central location where the records are accessible to the supervisor, employee and safety inspectors. Training records will be maintained for (5) years after the employee terminates or ceases to use the training. (See NPD 1441.1, Record Retention Schedule 3; 33 [3400] N 15-38, G Technical Training.) On-site contractors are responsible for maintaining training records for their employees.

8.6 Certification

Provisions shall be provided to issue certificates as well as to revoke them. Certificates may be revoked for negligence, safety violations, failure to meet medical standards, etc. The operator certificate (license to operate) shall indicate the type of equipment the holder is authorized to operate and the date to which the certificate is valid. Certification is valid for one (1) year. Certification renewal will include, as a minimum, training items in 8.1 Overhead and Gantry Cranes, Mobile (truck cranes), and Hoist, and/or 8.2

Powered Industrial Trucks.


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